Detecting Faint SNe From SDSS-II: SNS Data

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Standard Survey vs. Deep Coadd

- No SN spectra can be obtained
- Can focus on finding SNe with lower S/N
- There should be 1000-3000 previously undetected SNe within Stripe 82 with $z<0.5$

Previously Undetected SNe

- How many of these new SNe can we detect?
- Did we miss any SNe we could have used? Why?
- How effectively can low S/N candidates have useful light curves?

Seasonal Coaddition

- Coadded with SWARP each image that overlapped a specific pointing from each season: 2005, 2006, 2007
- Use CHI2, not a standard SUM or MEDIAN coaddition
- Pixel values, y_j in CHI2 are defined as (Szalay, A. et al)

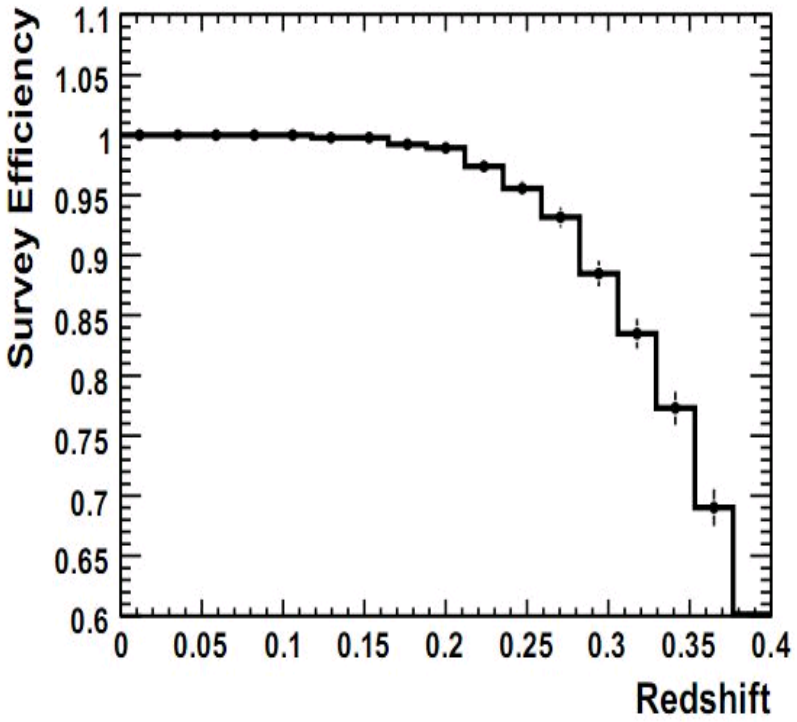
$$y_j = \sum_i g_{ij}^2 \quad \text{where} \quad g_{ij} = \frac{f_{ij} - \mu_i}{\sigma_i}$$

Progress Update

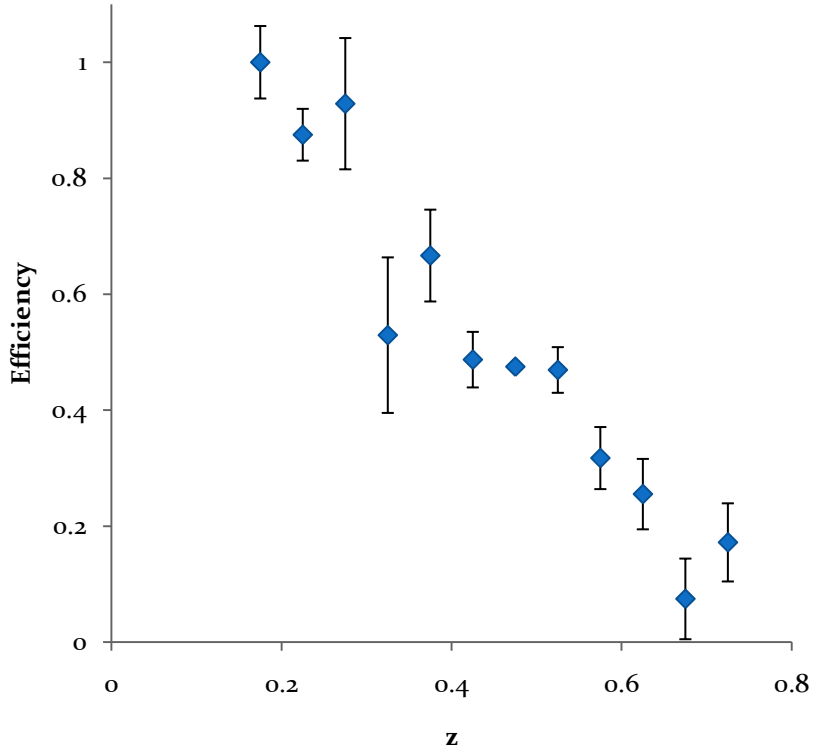
- Fakes inserted into SDSS images.
  - Simulated using SNANA
  - Preliminary efficiencies determined.
  - Hosts chosen based strictly on host r magnitude.
- Preliminary candidates analysed
  - Put through SMP.
  - Typed with psnid.
- Various coaddition issues dealt with.

Efficiency comparison

SDSS 1st year efficiency

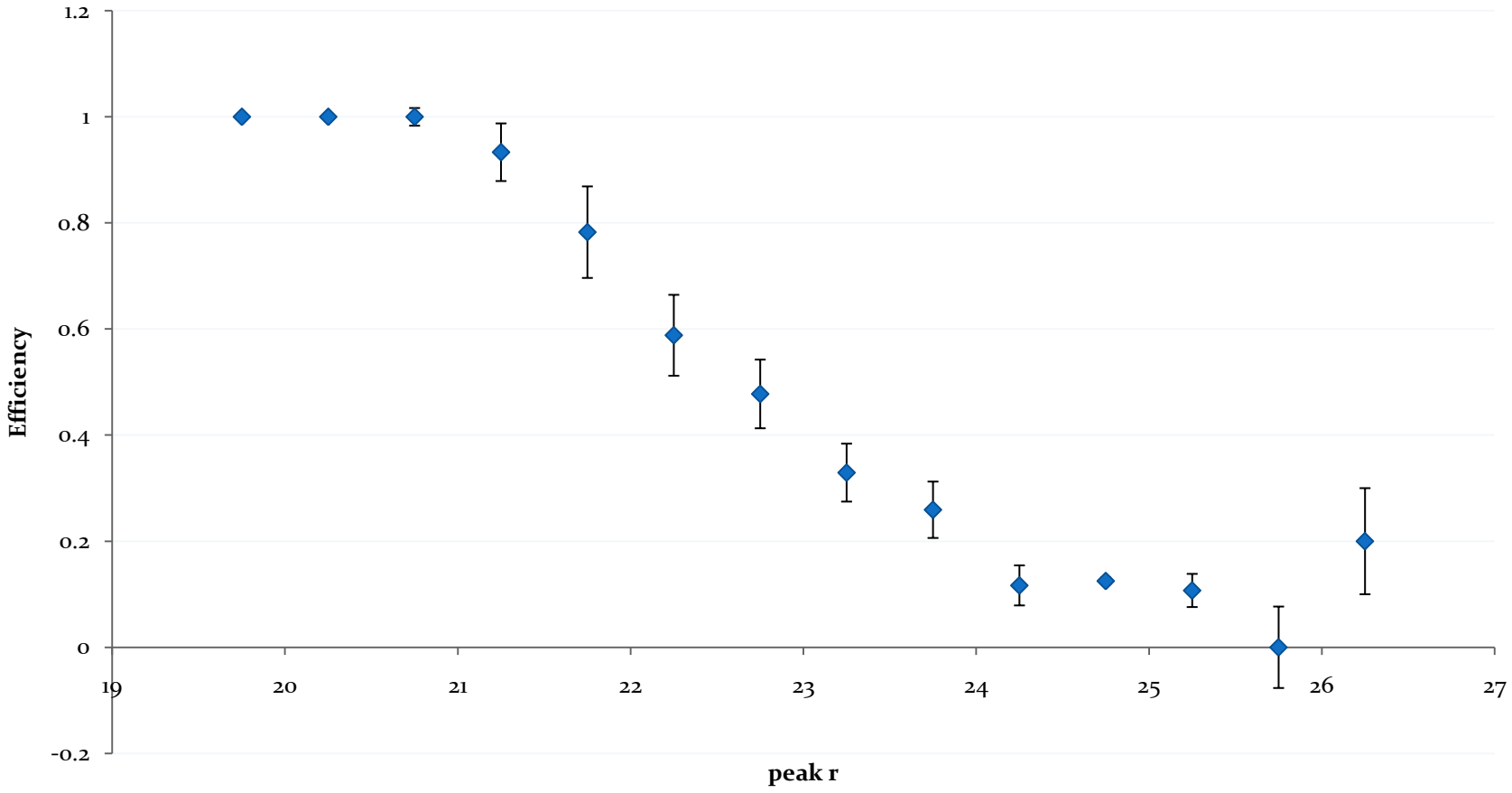


Efficiency based on 467 fakes

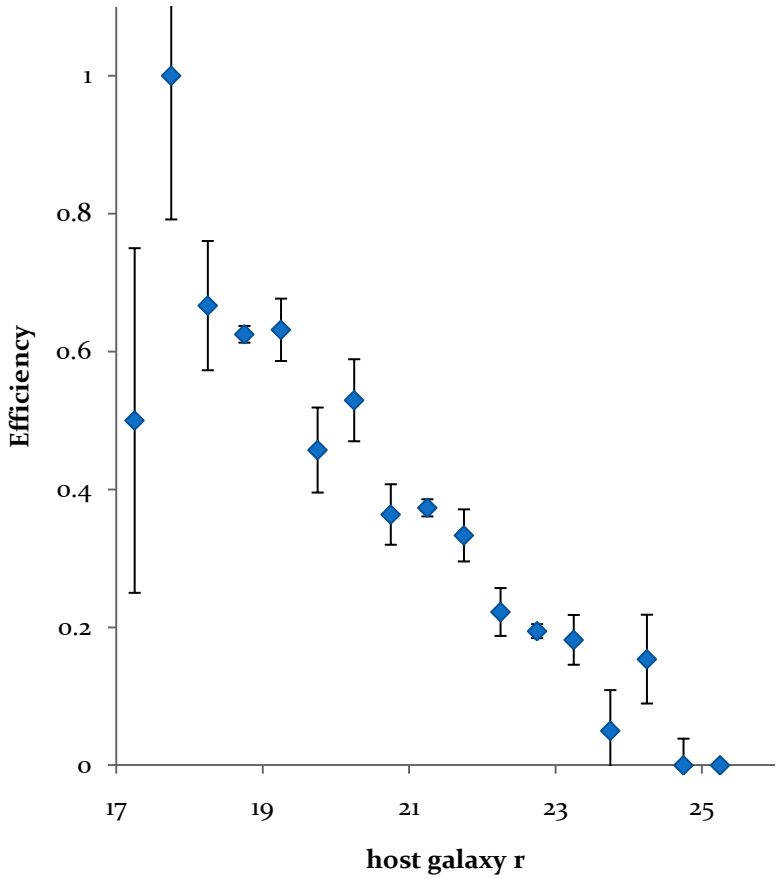


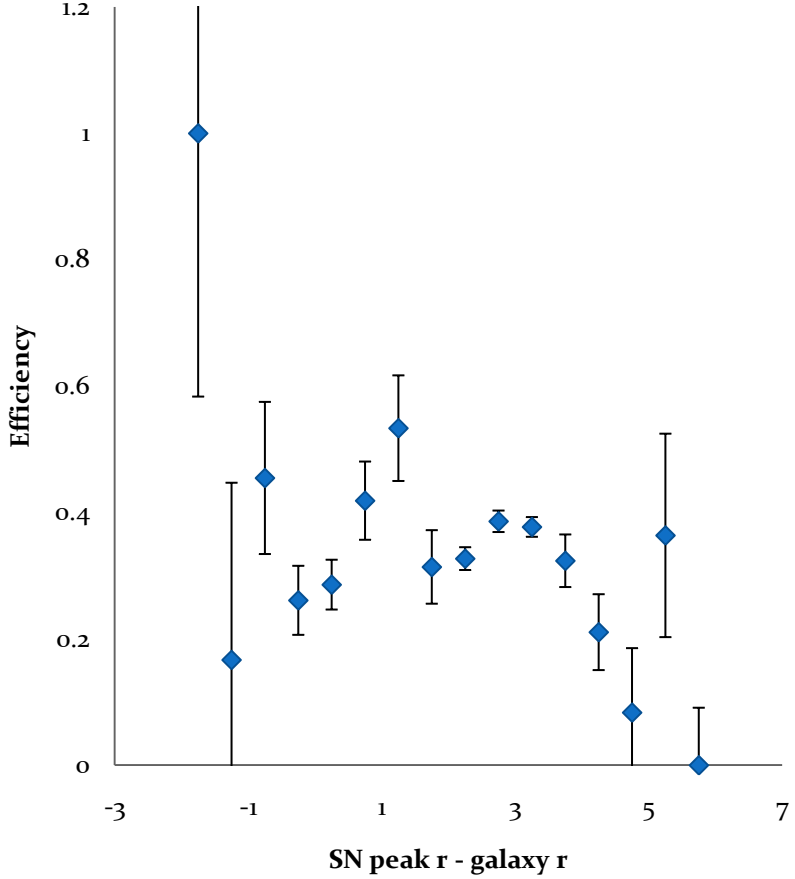
Dilday et al 2008

Peak r efficiency



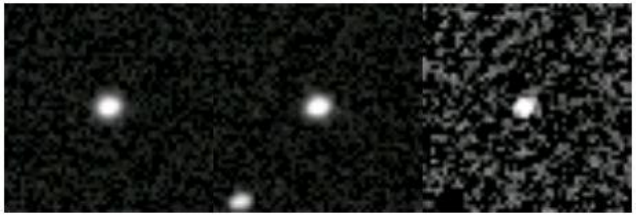
Novel Efficiencies?



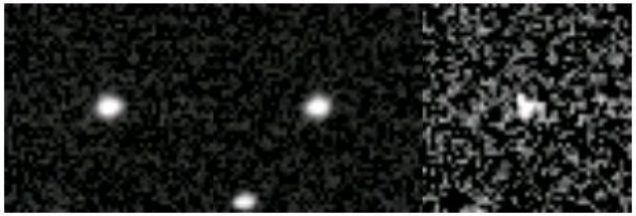


Our Candidate 4382*

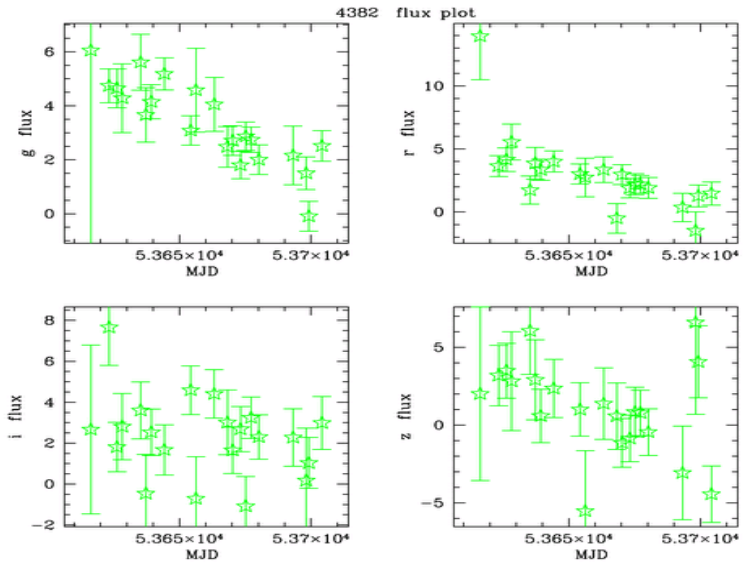
g (srch, tmplt, subtr)



r (srch, tmplt, subtr)

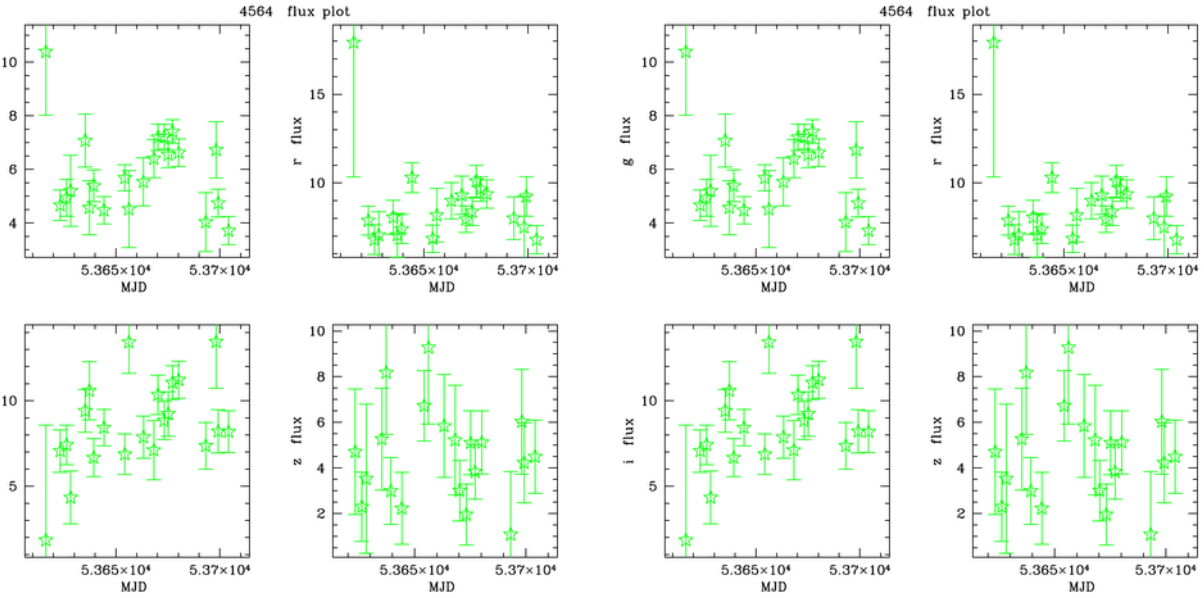


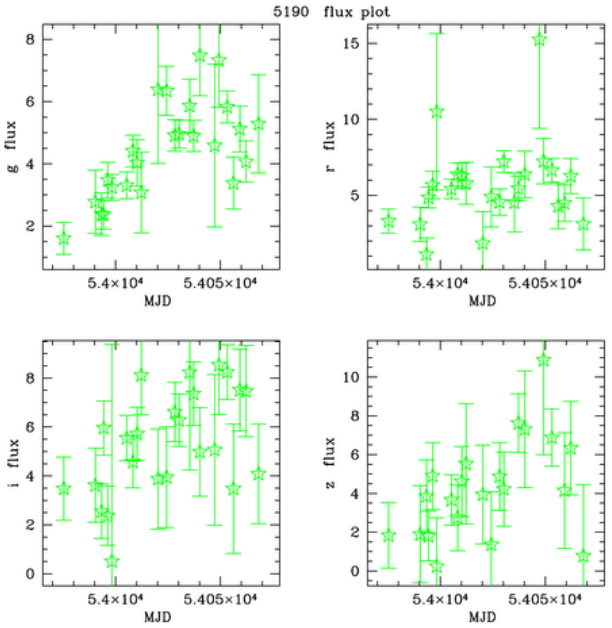
i (srch, tmplt, subtr)



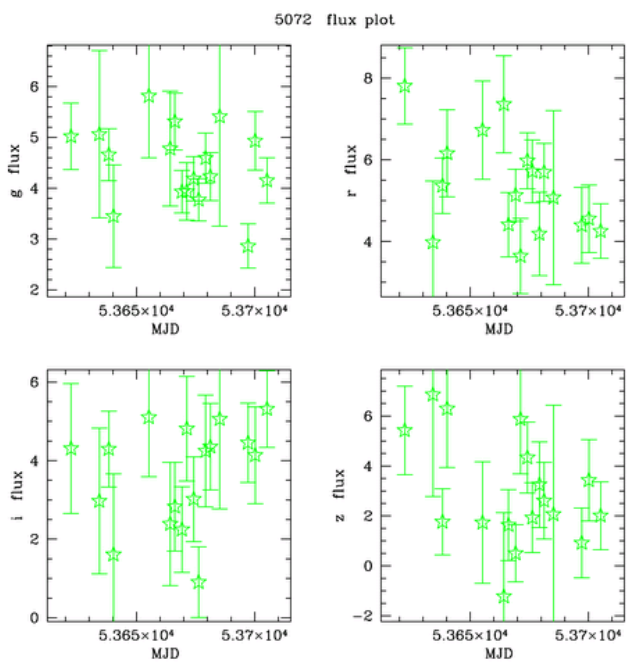
*Not SDSS Candidate #

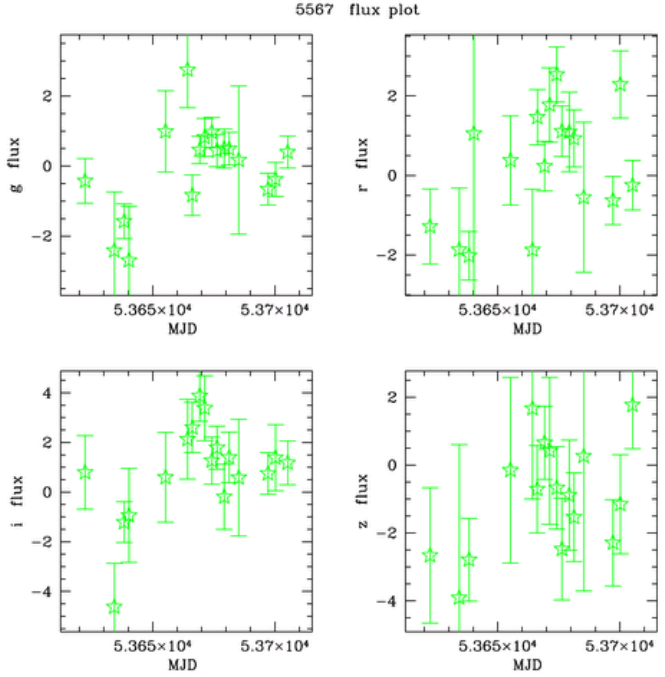
Other Good? Candidates (II)





Not Quite as Good (Ia)





Summary

- Identified and typed previously undetected SNe objects.
- Have used fakes and efficiencies to improve coaddition pipeline.
- Have processed ~2 square degrees
- Based on preliminary detections have improved efficiencies $0.2<z<0.55$
- Will be processing another 8 square degrees by mid December with a few hundred objects per pointing.